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Chapter 11 Decision-Making: *Using technology to enhance learning in police officers.*

Introduction

In previous work the potential of body worn video footage to accelerate decision-making skills was explored (Richards, Roberts, Roberts & Britton, 2017). Within this Chapter we elaborate on this work. Specifically, we include three examples of embedding technology into scenario-based training which have proved successful in other professions/domains; where complex decision-making is a key attribute for individuals engaging in those naturalistic environments. We outline the importance of the interaction between the creation of a slow, deliberate, reflective conscious training environment (training/educational setting), and the rapid in-action applied setting (naturalistic/vocational setting; Richards, Collins & Mascarhenas, 2016). Such interplay between educational settings and vocational settings can be integrated into the training programmes to accelerate the preparation and decision-making of police officers. In particular, the chapter outlines how the creation of such slow deliberate reflective environments, in context of various scenario-based learning, relevant to policing, can be manufactured to facilitate an individualised learning plan (Richards, 2004) and the formulation of shared mental models within a team context (Richards et al., 2012).

The aim of this chapter is to present an overview of how technology, particularly in the form of Artificial Intelligence (AI) can be incorporated into the naturalistic training setting to enhance individual and collective team decision-making within the police. To achieve this aim, we will first provide a brief overview of the various definitions of artificial intelligence and augmented reality and their application to police training and

preparation. In the second section, we will present an overview of the current demands of policing and the subsequent changes in the preparation of police officers, including the changing landscape of higher education and its role in supporting the development of future officers. The third section of this chapter will examine scenario-based learning but focus on the integration of technology to develop real-world training environments. Specifically, this third section, will consider the use of experiential and immersive learning which have been used for many years in other practice-based disciplines but to date, uptake within police forces appears to have been limited.

Artificial Intelligence

Artificial intelligence (AI) "…is a broad, multi-disciplinary field of study that concerns itself with the construction of machines and systems that perform functions commonly associated with cognitive capacities of the human mind" (Dechesne, Dignum, Zardiashvili & Bieger 2019, p.2). Whereas, augmented reality is "…an enhanced version of reality created by the use of technology to overlay digital information on an image of something being viewed through a device" (Hitchcock, Holmes & Sundorph 2017, p.20). According to the Dutch White Paper (2019), on the use of AI in policing in the Netherlands, there are many potential benefits of using this emerging technology including, predictive policing, automated monitoring, managing and pre-processing large amounts of data, image recognition from digital devices, integration of user friendly interactive services for civilians, and enhancing productivity and digital workflow (Duschesen et al., 2019). For example, the advantage of remote use of large data sets means that officers can be deployed to targeted high risk areas where crime is predicted (Hitchcock, Holmes & Sundorph 2017).

Predictive policing involves the utilisation of technological data and information from a variety of disparate sources, which is analysed and interpreted to highlight trends, patterns and key determinants which can be used to anticipate criminal action or activity. Such digital processes can be used to inform and shape preventative action resulting in the form of strategic interventions. Such strategic intervention can be designed to prevent crime and/or to respond to crime more effectively. Predictive policing has been used to predictive the location of future crime (predictive crime mapping; Oswald & Rinik, 2018). The report from Duchesne et al (2019), outlines several potential applications for policing but does also highlights, that whilst technology and specifically AI can excel in converting data into outputs, it requires formal rules and instructions; thus, making it difficult to automate tasks that rely on tacit knowledge. However, we would argue that intuition and tacit knowledge, appears to have an important place in terms of police decision-making.

Although the emphasis in literature to date, has been placed on predictive policing, we would argue that analysis of 'real time' information and data can be used to inform 'real time, in-action' decision-making processes of officers. This process is complex as it requires key data points in the environment to be identified first (Richards, 2004), before skilled individuals can interpret and make sense of the data points in context of the applied setting (Richard et al., 2009). It is only when experienced officers have engaged in the process of interpretation and sensemaking, can they establish connections between the data/information points. Such engagements result in a newly developed understanding of the situation (a higher level of comprehension) which the officer can use to inform future actions. Technology and AI can therefore play in a role in both informing 'in-action' policing using 'real time' interfaces (for example, drones, facial recognition) and also in a training context where officers are educated or

upskilled using a range of digital synthetic learning environments (for example, augmented reality, virtual reality and immersive learning environments).

Using technology to access such rich information in the form of large data sets, 'real-time' digital evidence, combined with the development of bespoke technological interference (designed to meet the needs of policing) results in the facilitation of a more effective training processes and more efficient workflow of officers.

To summaries this early section on technology and AI. Technological advancements can identify patterns in the data that would not necessarily be perceptible to humans (Dechesne,et al 2019). For example, video capturing devices can perform the task of facial recognition and can recognise criminals and key individuals automatically (Hitchcock, Holmes & Sundorph 2017). AI can also generate new instances of objects/pictures, videos, stories, faces etc, and can be used to generate or fabricate materials from scratch. All resulting in the design and development of synthetic learning environments. Whilst this clearly presents an opportunity for use as a training aid to generate scenarios; as a system it will only reproduce what has been programmed. Dechesne, et al., (2019) argue that AI therefore lacks any common sense and cannot communicate with people on an emotional level nor make moral judgements (Tong 2017). The use of intuitive knowledge remains poorly understood in police decision-making (like in many other domains) and further research is required to provide a better evidence to explain and support its use. However, research is staring to consider the interaction between the psychomotor and psychosocial aspects of decision-making (Richards, et al., 2016) and we would propose such work needs to

be expanded further to consider the human and machine (technology) interaction, especially in the context of human-machine decision-making and policing.

The demands of modern-day policing

It has been widely accepted that the number of officers has significantly diminished over recent years (Finnigan, 2017) and that more officers are required to support the increasing complexity and breadth of crime which is being observed in society. In response to this and the recent announcement by the British Prime Minister to recruit 20,000 new police officers in the immediate future (BBC, 2019), discussions are emerging as to how we can rapidly and effectively train a growing police workforce. With increasing attention being directed to the role that technology could play in accelerating the learning profile of police officers who are ready for deployment. It is also relevant and timely to direct our attention to the increasing numbers of police preparation programmes being moved into Higher Education and the emergence of apprenticeship pathways. Such learning pathways which integrate theory with applied practice will be responsible for the preparation of our future forces. However, understanding the nature of how this cyclic link from theory to practice can be maximised and accelerated requires a more in-depth understanding of learning and pedagogical processes. The creation of dual processing learning environments (integrating both theoretical and practical settings) which involve embedding scenario-based learning and innovative pedagogical mechanisms, can perhaps be one solution to accelerating the learning capabilities and decision-making in officers. Scenario-based learning facilitates a safe, low risk environment where mistakes can be made and learned from. Equally it is an environment where effective mental models relating to specific situations can be developed (Richards et al., 2012; Merola and Richards,

2010) and one which proves to be cost effective. In 2012, it was estimated that recruiting and training a police officer costs £12,000 per officer (Nottinghamshire Police, 2012). The advancement in technology combined with enhanced understanding of pedagogical processes enables technology to be more dominantly integrated into the training context to accelerate the decision-making and learning of officers across a range of situations. Depending on the technology used, there is scope within the learning environment itself for information to be layered and to be adapted to meet the needs of the individual learner and context they find themselves in (Richards et al, 2016). In doing so, such an integrated dual training approach can accommodate the training needs of novice officers but is also relevant to the enhancement of expertise in experienced officers and specialised units. Such a layering approach to knowledge development enables the complexity of information to be built upon, resulting in the development and refinement of performance related mental models/shared mental modes relating to situations, and accelerated decision-making capabilities in both individuals and specialist teams. We assert that combining the dual process of Decision-Making Framework (Richards et al., 2016) presented within this chapter, with scenario-based training using technology could accelerate decision-making in individual officers and members of specialist teams collectively.

We acknowledge that society is changing and as a result the nature of policing is changing. It is beyond the remit of the chapter to examine all of these aspects. However, to present the reader with a context to see how technology can be integrated in police training, the examples provided are typical of incidents which are encountered in society today.

In line with other practice-based disciplines there is a recognition that police officers make high-level, fast paced decisions in complex and changing circumstances, where not all information may be present. In England and Wales, the routes to becoming an officer are varied; through an apprentice route, obtaining a higher education degree or through a career change, where previous career experience can be transferred. Regardless of the route which individuals choose to enter the force, the training process must capture and develop the range of diverse individual skills. The training will maximise the attributes which individuals bring to the role but also refine and shape them in a manner which enables future officers to perceive and attend to challenging situations in a similar manner, demonstrating a collective thought process. Such a collective thought process (Shared Mental Model, Richards et al., 2016) may be force specific, although commonalities across multiple forces can be observed. It is important to acknowledge that there are multiple ways in which a successful incident outcome can be achieved; but the preparation of officers should ensure that similar principles guide the officer's responses. Attention is increasingly being directed towards how officers are prepared to function in complex modern societies. The process of developing shared situational awareness (Klein, 2004) is complex and requires officers to develop a common understanding of roles, policies, procedures and tactical knowledge, which evolves over time as vocational experience is gained. In this chapter we propose that although there is no substitute for experience, training in an environment where technology is integrated with experiential learning could, if designed correctly, support the preparation of police officers' skills to accelerate learning and decision-making.

Over recent years there has been a rapid increase in the number of policing degrees which have emerged in Higher Education Institutions (HEI) in England and Wales and

the role such establishments play in the creation of probationary constables and later officers. As a result, there is an increasing focus on the provision provided by these HEI where classroom learning is combined with applied situated learning experiences, which incorporates elements of real-world experience. The apprenticeships schemes follow a similar, albeit slightly different path. Many United Kingdom (UK) police services have already embarked upon this journey of hybrid learning where theory-based learning settings are integrated into an applied learning experience. However, the approach to training varies between forces (Finnigan, 2017). Although the mechanisms of hybrid learning are not isolated to the HEI setting and are equally relevant to individuals entering the force from the apprentice route or via a career change, the most effective mechanism to train our next generation of officers are still being explored and examined. However, the integration of the Police Education Qualification Framework into a degree level qualification has been the topic of a significant number of conversations, with the emphasis being placed on whether the integration of a degree qualification with applied experience can result in the development of officers capable who possess the right skill-set. This chapter therefore attempts to open discussion and conversation amongst serving officers, academics, researchers and other specialists concerning with hybrid learning. Specifically, the chapter will explore how technology could be integrated into the initial preparation and subsequent specialist training to develop police officers.

It is essential therefore that all entry routes into the police force enable the individual to experience and be prepared for the appropriate complexities which exists within the policing role. It is recognised that policing is becoming far more complex than ever with new crime classifications emerging (Finnigan, 2017; College of Policing, 2015). The demands of policing have been simply classified into ‘incoming demands’ and ‘on-

going demands' (College of Policing, 2015) increasing the daily work environment for officers. For example, incoming demands include arrests, road traffic collisions, stop and search, missing persons and place of safety orders. Whereas on-going demands include engaging with Multi-Agency Public Protection Arrangements (MAPPA), supporting families enrolled on the 'troubled families programme' and supporting the Child Protection plan, to mention only a few. However, in reality the picture is far more complex. Multiple factors contribute to the changing nature of policing. Increasingly communities across the UK include a wide range of individuals from diverse social and complex cultural backgrounds, the increased dominance of social media and technology, exploitation of children/vulnerable adults, fraud and mental health related situations are to mention only a few. All these elements are increasing the daily demands placed on officers as they respond to societal changes. Although the core role of the police and policing remains the same, with the focus of protecting the public, there is an increasing need to understand the changing societies in which we live and the current impact of such demands on officers. The changing nature of policing has to consider the level of risk, threat, harm and vulnerability (Finnigan, 2017), further increasing the complexity in which modern police officers and forces function. Such a change in the nature of policing justifies the inclusion of additional policing skills. Such attributes require officers to engage with a higher volume of information which is increasingly complex, in addition to working and sharing information across multi-agencies and teams. The impact of developing such sophistic skills requires training approaches to be realigned to accommodate the development of new 'skill-sets' which are required by police officer to function effectively in both the current community settings and years beyond. The creation of synthetic learning environments, which integrates theory into applied naturalistic settings, and which is

adaptable to all settings, could be, in proposed as a solution to advancing policing skills at all levels.

Training and upskilling the next generation of officers.

Having addressed the recruitment of officers in the section above through the exploration of the changing demands of policing. This next section will focus on the preparation of officers.

Broadly speaking the initial training schedule for officers has not altered over recent years. Training typically consists of phases of classroom-based learning, on the job tutorship and initial probation period followed by an extended period of probation over two years before becoming a fully-fledged officer. Although it is difficult to garner an exact and accurate picture across all the forces. For example, a Freedom of Information request (FOI) was asked of the Metropolitan Police (and others) by a third party, to release their training catalogues and describe what they were training. This was declined (https://www.whatdotheyknow.com/request/police_training). Although the sensitivity is acknowledged in context of training, there is a need for pedagogical and subject experts involved in research and academia to work more closely with organisations such as the emergency services and enter into dialogue where education and training can be supported from a holistic perspective. Such an approach could potentially accelerate development of skills (and specialist skills) in emergency specialist services, maximising resources and producing cost saving benefits.

The existing recruitment process therefore appear to face two challenges with regard to curriculum content and the integration of technology/AI to support training/development of officers. Firstly, greater clarity is required relating to the current curriculum content for individuals who join the police through the traditional

channel (not through the degree route, where the College of Policing curriculum is adhered to). As highlighted above, accessing information with regards to the content of this traditional curriculum is difficult and it appears that the curriculum might vary across different police forces. Without developing an understanding of what is currently delivered it is difficult to support the design and development of synthetic learning environments. Such synthetic learning environment can be embedded into the training curriculum of police officers, where technological elements and AI can be integrated into the synthetic learning environment to enhance the development of both psychomotor and psychosocial skills. Such integration could support the facilitation of modern-day policing skills, and equip officers to function in a complex, dynamic world which is continually changing. We see such synthetic learning environment being a hybrid bridging theory and practice and being utilised in both the traditional entry routes and degree entry routes, in addition to surving the purpose of upskilling of more experienced officers, as part of professional development.

Secondly, and building the discussion in the previous paragraph, current recruitment seems to be based in many forces around values-based recruitment, centring on the Code of Ethics. What this has tended to mean is that values and behavioural approaches deliver a different kind of police officer and is linked to a Code of Ethics. Arguably, police officers are required to be more emotionally intelligent and society aware than in previous times owing to the complex and continually changing environments in which they work. For many officers, modern day policing requires not only the understand of the legalities of the incident, but the contextualising and understanding the cultural, social and political context in which incident occurs. All increasing the complexity of modern-day policing. Softer skills of conflict management (conflict diffusion, National Decision-Making Model) and THRIVE (Smith and Swann,

2019) are considered to be key attributes of current police officers (College of Policing, 2019) which can be development through the creation of synthetic learning environments using technology and AI in both the initial training stage and later professional upskilling.

Training in the classroom phase and the tutorship period appear to remain unchanged (by and large) and consist of role playing, insight from tutors based on their experience and often civilian trainers. Forms of technology such as VR and AR training are being integrated but appears to be restricted to specialist units such as police firearms weapons and tactics training. Creating a synthetic learning environment, through the integration of technology, for example VR, offers limited or no risk to participants, as the environments are designed to be safe, controlled, and involve realistic scenarios. For examples, in a training scenario, offices can engage with attending a drunk and disorderly incident in a synthetic learning environment. Such a synthetic learning environment (scenario learning in a technology environment) can develop psychomotor skills (e.g. what information should be attend to and when) and psychosocial skills (awareness of situational factors; this would include not only cultural and political issues etc. but also the dynamic of relations with fellow officers, the victim and criminals involved in the incident). In addition, the synthetic environment allows the novice officer (or developing officer) to learn from more experienced officers with regards to the application of legal issues / policing policy in context of the drunk and disorder incident they are engaging with in the synthetic training environment (e.g. applying the law, engaging with THRIVE).

Tong (2017) explains that the traditional route to becoming a police officer which has long emphasised the need for legal and procedural knowledge (both of which are

gained on the job over time) has served the police force well without the need for a graduate education. Tong further argues that the importance of 'craft skills', described as negotiation, discretion and judgement are under recognised and therefore should be formally accredited in some way, just as they are in other professions such as education, law and medicine. Hitchcock, Holmes and Sundorph (2017) call for more dynamic, technologically based training methods to be used in the preparation of future officers. For example: the 'cyber bungalow', which facilitates learning through carefully created digital crime scenes. Officers can use the virtual environment to collect digital evidence in an instinctive manner within a training setting. Furthermore, AI also has the potential to enhance officer resilience through the development of strategies, as the officers are progressively exposure to crime scenes through a synthetic learning environment. However, more robust evidence is required to substantiate this potential. Finally, AI can be used as a training aid, where augmented reality glasses formatted with display information relating to a particular context can used warn by officers to help them identify important evidential clues at a crime scene (Hitchcock, Holmes & Sundorph 2017). Augmented reality glasses could be a useful mechanism to accelerate decision-making in officers as they can be guided to attend to important environmental clues / data points (Richards et al., 2018).

Such technological training can be engaged with remotely saving time and money, while simultaneously accelerating mental models and shared mental models (Richards et al., 2012) of performance in officers when the correct pedagogical process is applied. Additional benefits of creating synthetic learning environments for officers to training in relate to the development of teamwork and connect thought processes in officers ('connected mindset'). The integration of hybrid technological within the training settings, can be used to develop team performance between

officers, by the construction of shared mental models with officers (meaning that officers perceive and attend to the situations in the same way, agreed understanding). Serfaty, MacMillan, Entin & Entin, (1997) defines mental models as '... internal representations of the external world… [which] represent the experts understanding of the situation' (p.235). Officers communicate their understanding of information and the context of the situation which they are experiencing in the synthetic training context. The scenarios act as a vehicle to trigger recall from memory, the identification of decision points, the development of critical reflection and problem solving, leadership skills and finally the development of enhanced individual and team communication skills. The process of individual reflection (which is shared with other officers) is key within this process, as officers can verbally share what information they notice, attended to and how they have prioritised the information. Such information outline through verbal reflections is then 'framed' in context of the scenario they are engaging in. This process enables the officers to individual and collectively make sense of the information relating to the incident being explored within the training setting, and in doing so construct shared mental models amongst officers. These shared mental models will shape future actions in the real world (individual and team), and result in more effective, rapid action decision-making. Lessons from sports environments indicate that engaging with technology in training environments can enhance individual and team performance levels (Richard, Collins and Mascarenhas, 2012; Richards et al, 2016).Engaging in such scenario-based environments improves retention and recall, enables complex problems/situations to be 'chunked' into phases allowing for a greater level of complex information to be dealt with across multiple individuals/teams (Richards, Collins & Robbins, 2019). Finally, such environments accommodate multiple learning styles, are innovative and motivationally enjoyable.

Recruits are encouraged to learn through and from their experiences using hybrid learning approaches. The integrating of reflection within synthetic learning and hybrid learning environments is a key aspect of the learning/training process and will be examined in later sections of the chapter.

The following sections use exemplars to outline the integration of technology into learning contexts. Owing to the complexity of both range of contexts and complex situations which officers need to be able to respond to, the decision was made to focus on three examples where hybrid/synthetic learning using technology can be used. The identified context used within this chapter will relate to an officer dealing with incidents relating to mental health. To illustrate the application of technology into the hybrid/synthetic learning setting two environments have been identified, these being, individual personal learning environments, immersive learning environments both integrating the application of a Decision-Making Framework specifically designed to develop team naturalistic decision making and shared situational awareness (Richards et al, 2016).

Contextualising learning in setting:

Police officers increasingly require an awareness and skills to deal with mental health and mental ill health, in addition to supporting individuals with a learning disability including autism (McDaniel (2019); Crane et al 2016). Neurodiversity is a term used to describe a group of “non-related, cognitive disabilities such as Dyslexia, Dyscalculia, Dyspraxia/DCD, Autistic Spectrum disorder, Asperger’s Syndrome, Tourette’s Syndrome and Attention Deficit Hyperactivity Disorder (ADHD)” (Dalton 2013. p72). Lane and Kelly (2012, p.2) highlights that since the 1990’s there has been a sharp rise in diagnoses of autism, and therefore, it is reasonable to expect that more

individuals with such diagnoses will at some point come into contact with police as either perpetrators or victims of crime. Chown (2009) argues that people with autism have a triad of differences when they come into contact with the criminal justice system; they are between 4-20 times more likely to become victims of crime, and 10 times more likely to experience robbery or sexual assault. In addition to increased risk of being a victim, autism itself may be a factor that predisposes individuals to commit criminal acts and that make them more vulnerable when being treated as a suspect by a police officer (Chown, 2009). More importantly, Chown (2009, p.60) states:

> "Criminal justice system personnel need to be aware of the range of symptoms a person with autism can present with so that they (the police officer etc) have a good chance of identifying autism in a person with whom they are in contact. If they are unable to do this there is a significant risk of the behaviour of the person being misinterpreted (as a refusal to comply with a reasonable request for instance)".

A carefully constructed learning synthetic environment can replicate a real-world situation very well, including the sights, sounds and even smells that can be vital cues to guide police practice. The next section of the chapter will explore the learning environment more extensively to highlight how different technologies can be incorporated into the training, to create a safe learning environment that facilitates active experimentations and the formulation of mental models relating to the specific context.

Technology, training and Policing:

Developing a personalised reflective learning environment for policing using technology:

Personalised learning environments aim to encourage reflective, interactive and self-managed learning that incorporates "social, emotional, cultural and deeply intrapersonal" learning experiences (Shaikh & Khoja 2014, p.203). They are more learner driven, enabling individuals to take control of and manage their own learning in an interconnected, digital world. Individuals use that world to communicate and develop collective know-how (Shaikh & Khoja 2014). The virtual environment is flexible and can be adapted to individual learner requirements. The technology enables each learner to create their own workspace and in so doing the learner becomes more self-reliant, connected to others and self-aware of their own learning (Shaikh & Khoja 2014). In order to be effective, Syed-Khuzzan, Goulding and Underwood (2008) caution that virtual learning environments must have a robust pedagogy as a foundation; blending learning content with learning style. Bringing together subject knowledge and pedagogical expertise produces learning objectives. A learning object is any "resource or content object that is supplied to a learner by a provider with the intention of meeting the learner's learning objective(s)" (Vercoustre & McLean 2005, Cited by Syed-Khuzzan et al 2008). The learning objects are reusable and can be used in different ways by different learners.

Personalised learning environments for policing could include the development of a range of digitally based scenarios that the learner can enter into, in order to either participate or observe. The scenarios should of course be rooted in the real-world of modern policing, but also have the potential to provide first hand experiential learning and vicarious learning through the experiences of others as performances are shared. The beauty of personalised virtual environments (where the individual wears a headset) is that they can facilitate *Just in time delivery*: being used at the time and place of the learner's requirements; and when combined with wearable technology

have the potential to make use of real time assistance to provide feedback on performance. Thus, enabling the mentor or teacher to be virtually present and further accelerate the development of mental models.

Virtual reality uses a range of technologies to enable learners to interact with a virtual environment (Berg & Vance, 2016). It is thought that using virtual reality, the learner can be exposed to a myriad of environments in a short space of time and as such is able to gain valuable experience, knowledge and manual abilities that would otherwise take many years to accrue. It is understandable that practice-based disciplines (such as nursing, military etc.) are using virtual reality to accelerate the development of students.

Policing Exemplar #1

The following case study outlines a scenario that was played out by two actors and recorded for use by a single-user VR headset. The student officer wears the headset and experiences the situation first-hand and/or in collaboration with an experienced officer. In either setting, the student officers are able to confirm or refine aspects of their mental model relating to the situations, which can be used to shape and inform future actions.

Example: Samuel is an accountant, he has been a high performer throughout his life; but he finds social situations difficult, so tends to avoid social gatherings; preferring to stay at home with his partner George. George has periods of low mood and at times gets very frustrated with Samuel over his avoidance of going out with friends. Both Samuel and George can become withdrawn and uncommunicative. Over recent months, the couple have been bickering and their relationship appears to be suffering as a result. The police are called to the couple's flat following a call by a neighbour

citing shouting and what appears to be two men fighting and sounds of glass being smashed. On arrival at the scene, both men have facial injuries consistent with fighting and George has a bottle in his hand.

This common scenario can be used by individual learners to personalise their learning in a number of ways:

- Individuals can reflect on their preconceived ideas relating to domestic or intimate partner violence
- Individuals might consider how they might establish whether either man has any issues that they should be aware of.
- Beginning officers might work with more experienced officers to learn to read the cues from the environment in order to ensure personal safety.
- Some learners will focus on their communication and interpersonal skills when approaching both men.

It is acknowledged that personalised learning makes a valuable contribution to training, development and contributes significantly to the development of professional and leadership skills, the development of team cognitive skills (shared mental models, shared situational awareness, team metacognitive, application and heuristics processes; Klein, 2000) and requires an increased level of social interaction. Social interaction (soft skills, communication, leadership, negotiation etc.) forms the cornerstone of modern policing. Immersive learning environments can be very useful in helping officers to examine social interactions in a range of carefully selected real world examples where multiple individuals (offices and actors) can engage in the synthetic learning environment simultaneously.

Created Immersive learning environments

Using simulated learning enables the students to learn in an environment which Schön (1987) describes as a practicum: a setting designed for the purpose of learning a practice, in a context that approximates a practice world where students learn by doing. Within the practicum there should be the suspension of disbelief in order to both view the scene as an audience member and become an actor as part of the scene (Roberts & Greene, 2011). Roberts and Greene (2011) argue that simulation is an effective method of teaching critical thinking and clinical reasoning skills. Students are able to synthesise the knowledge they obtain in the classroom and gain comfort and confidence in dealing with challenging policing situations. Students can participate as active learners but can also learn vicariously as they observe and consider the experience of others who participate in the scene. The environment itself enables learners to engage in a safe realistic space and enables them to understand the complexities of human relations and interactions. In other words, exposure to realistic policing situations through immersive learning environments, helps the learner to begin to think and act like a police officer; rehearsing and refining communication and social interaction skills.

How can immersive, experiential learning be used in police officer preparation?

Experiential learning takes place through personally experienced events; these may be experienced during the reality of the working day or can be artificially but judiciously manufactured as an immersive learning environment. The individual experiences a situation within an environment, is then encouraged to discuss their performance and their learning with tutors and peers and is often asked to reflect or think about that learning in a purposeful way. The final part of the cycle involves the individual

considering how this new learning will be incorporated into their practice should they meet a similar situation in the future.

Whilst some training of officers relating to neuro-diverse individuals may be ongoing, it seems there remains a need for training tailored to policing roles (Crane, Maras, Hawkden, Mulcachy & Memon, 2016). The following example will explore how such an incident can be embedded into an immersive learning environment.

Policing Exemplar #2

The creation of an immersive environment to replicate the scene of the crime and /or the police station where the individual is detained and questioned.

Individuals with autism may be susceptible to persuasion by officers. Again, the police officer can rehearse interview skills that avoids asking ambiguous questions that may lead to incorrect answers being offered. For example, Chown (2009) explains: 'If (an officer) asks, "Were you with your family or John?" the autistic person may respond, "John" because that was the last choice of the sequence', so the officer should ask 'a more specific question such as, "Who were you with?" thus reducing the influence of suggestion to the subject'. Similarly, the officer can be alerted to the changes in perceptions of personal space for an individual with autism; as the standardised patient can reproduce appropriate responses.

An immersive environment can be purposefully constructed (using a standardised actor) who can display a range of appropriate responses to a situation; together with a replication of the environment itself using a virtual, digital world. People with autism

may become aggressive or try to run away. Chown (2009, p.261) describes these options as 'fight, flight or fright'; individuals with autism may want to seek a place of safety which to a novice officer may arouse suspicion. In such situations officers need to practice providing simple, clear and direct instructions. Furthermore, the scene may progress to an immersive environment to include the police station and or police interview.

Autistic individuals can experience sensory overload when faced with busy, noisy custody suites (Crane et al 2016). In medical immersive learning settings, well-briefed standardised patients are well versed in replicating a range of signs and symptoms experienced by individuals with mental health issues and /or autism and will respond appropriately to the sensory stimulation, perhaps become aggressive and anxious.

Referring to the examples above; integrated created immersive learning environments can be used by individual learners to enhance their learning in a number of ways:

- Enhanced communication and team working, as learners can use the scenarios individually or in groups or teams (including inter agency or interprofessional learning).
- Scenarios can be judiciously selected to rehearse particular skills sets or protocols for given situations; for example, interviewing techniques.
- Scenarios can be more flexibly adapted to suit the stage of the learner journey: beginner, more experienced officer or expert.

Immersive environments which allow for the type of active experimentation suggested here, may provide one solution to helping new or probationary police officers to acquire what might be termed as 'softer skills' such as communication. For example, using communication as an exemplar skill, officers are able to construct statement

using carefully selected language and grammatical terms to 'shape' the desired outcome for the situation. Officers are able to construct such effect communication skills by drawing on shared mental models relating to the situation (constructed in the immersive learning setting) which consider all individuals, the context and cultural issues etc salaciously in context of what the desired future action would be. Bahreman and Swoboda (2016) in a medical context, quite rightly point out that establishing cultural competence encompasses more than just learning about different cultures. A true emergent experience using standardised patients (victims and criminals, in the context of policing) and scenarios, highlighting the cultural considerations that professionals need to be cognisant of and comfortable with can provide a new way of teaching this important aspect of practice.

More specifically, responsive learning environments capture the real-life situations, normally recorded by video footage (e.g. Body Warn Video, filming). The footage is used to acquire an expert's mental model ('alpha vision' of performance, Richards et al., 2009). For the purse of this chapter and to provide the reader with an overview of the 'alpha vision of performance' has been defined by Richards (2019) as:

> "The '*alpha*' vision of performance contains the knowledge structures and shared perception held by multiple individuals relating to a particular situation, team task or action. The 'alpha vision' is divided into a number of sub components (several shared mental models, which collectively make the 'alpha vision'). The 'alpha' vision (cluster of shared mental models) shapes and defines what information individuals collectively attended and priorities within an applied setting, which relates to their own roles and the roles of others, and represent the 'ideal' outcome of what the members are trying to achieve and how best they will approach the task. The '*alpha*' vision includes both psychomotor aspects (information, data and decision points) and psychosocial aspects (culture, politics, values and team philosophy etc).

Using Cognitive Task Analysis Shared Mental Model (SMM) belonging to expert officers can be captured and used to develop the Shared Mental Model of the developing or probationary officer . Such expert SMM contain information relating to information and data pointes within the incident/situation, the task, the officer's own role and the roles of other individuals involved in the situation and a shared understanding of how to complete the task (or deal with the situation; Richards et al., 2016). Such SMM, when developed in novice offices can be operationalised within the real world of policing, as knowledge and information stored within the SMM help shape what information the probationary officer attends to and influences their future actions and behaviours. The following section will present a Decision-Making Framework (Richards et al., 2016), which has been empirically test in elite sport and which is transferable into training police officers.

Responsive immersive learning environment: Operationalising Shared Mental Models in a policing context, application of the Decision-Making Framework (Richards et al., 2016)

The Decision-Making Framework (Richards et al., 2016) proposes that team decision-making is developed by layering information using two dual processes which illustrates the interaction between a reflective learning environment (educational setting) and an in-action naturalistic applied setting (real-world setting). Such real-world settings can be training, competitive or vocational environments. The framework highlights how individual cognitive thought processes can be collectively developed in a progressive manner to establish a collective team mind-set (Weick & Roberts, 1993) and the development of a shared mental models (Oranasanu & Salas, 1993) of performance. Such shared mental models are specific to situations and include the roles and

responsibility of individuals involved in the context (Richard et al., 2012). The formulation of such knowledge in a progressive and structured manner allows for individuals to develop a shared perception of the situation, resulting in effective communication and action in the applied setting.

The Decision-Making Framework outlined below supports the National Decision Model for Policing (College of Police, 2013c). By layering the content of information as outlined in Model 1 (psychomotor elements) of the Decision-Making Framework the complexity of the decision can be progressively increased. The Framework enables existing knowledge held by officers (these are referred to as 'passive' Shared Mental Model, and are based on experience) to be matched/examined with perceived information, which the police officers are attending to at the incident (assessing data points, which are important information they need to attend to). The clustering of information into phases and in context of the situation result in a suitable course of action being taken ('action intelligence'). Existing Shared Mental Models ('passive' shared mental model) contain information which is used to inform the officer's understanding of the situation. New information specific to the situation is added to these 'passive' Shared Mental Models (Richards, 2019) to contextualise existing knowledge in the milieu of the new situation. This process of matching existing knowledge to new perceived information in the incident enable existing shared mental models to become refined and operationalised. It is these new 'active' Shared Mental Model (SMM which get refined and operationalised), which is specific to the situation and shapes future behaviour (Richards, 2019).

Decision-Making Framework (Richards et al., 2016)

The complexity of developing team or collective decision-making is too dynamic and multifactorial to be illustrated singularly, in one simple diagram. The Decision-Making Framework is constructed of two interconnect models (Model 1 & Model 2). In doing so, Decision-Making Framework incorporates both psychomotor (individual and team understandings) and psychosocial (team philosophy and performance/applied context in which, the decisions are made) elements of team decision-making. The creation of pedagogical processes which addresses psychomotor and psychosocial mechanisms are outlined in Model 1 and 2 (see Richards et al., 2016 for specific detail on the models) and results in the effective identification, interpretation and communication of key information in competitive situations, eventuating in successful team play. An overview of the two interconnected models is presented below with the reader being referred to Richards et al, (2016) for a detailed account of the framework and working mechanisms of the Models 1 and 2.

Model 1 (psychomotor) illustrates the psychomotor processes which are required to develop a shared team cognitive thought process, which itself is positioned within the context of the team's philosophy. Such processes require information to be seen and valued in the same way by all team members, resulting in the construction of Shared Mental Models of performance. Model 1 therefore outlines the concepts which necessitate the development of five layers of information which are required to develop team decision-making (Model 1, Richards et al, 2016). Although illustrated separately to provide clarification, the five phases continually interact and define each other. Through the process of individual empowerment, each of the layers addresses the

development of Shared Mental Models (SMM) and the contextualisation of these structures in the applied settings.

Model 2 (Richards et al, 2012) illustrates the psychosocial process involved in co-ordinating individual perceptual representations of situations, so a collective team cognitive thought process can be obtained. Model 2 demonstrates an empirically tested framework that illustrates the interaction between the slow deliberate reflective environment and the rapid on-field competitive/applied environment with the focus of developing team decision-making. It is relevant to state that much of what is being proposed here has already been tested empirically in high level elite sport (hockey Richards, 2004, Richards et al., 2009; professional youth football, Merola & Richards 2010, Richards, Penrose and Turner, 2015; Professional senior football, Bate & Richards, 2011;netball; Richards et al., 2012 and police (initial exploration, Phase 1) Richards, Roberts and Roberts, 2017. In short, the start of the model has been designed to address and explore a real performance issue of how teams make decisions in highly pressurised naturalistic settings.

The Decision-Making Framework provides practitioners with a structured approach to accelerate team decision-making within the applied vocational setting. Within the context of policing, the framework can be used to accelerate the decision-making capabilities of probationary or junior officers through the capturing and recording of the expert mental model of a situation held by experienced officers. For example, the Decision-Making Framework can be integrated with BWV (Richards et al., 2017) and also with 360 dome footage or video capture, and used to help probationary officers develop a SMM of the situation based on the content knowledge articulated by the expert (experienced mentor). The development of a SMM enables the developing

officer to attend to information in the same way as an experienced officer and prioritise the information in an effective manner. The formulation of such SMMs in an educational learning setting which integrates technology (e.g. BWV) enables shared mental models to be operationalised and become 'active', in turn shaping the physical actions of officers. Such 'active' shared mental models' incorporate the essential skills required to engage in shared situational awareness with colleagues. The Decision-Making Framework is also relevant to working across multi-agency teams.

Policing Exemplar #3

Example: A junior office is called to attend an incident on a local housing estate. Resident at the property is Donna a single mother, and her two children: Matthew (age 16 years) and Robert (12 years). The younger son is out playing with his friend and is unaware of the situation at home. The older son, Matthew has been caught stealing from his mothers' purse. The call has been received in response to a neighbour's concern of hearing loud voices and things being thrown. This is a regular occurrence, the police have been called many times to the child at home and at the school he attends in address of his disruptive behaviour, Matthew has Asperger's syndrome. When challenged Matthew's behaviour becomes violent and aggressive. The argument started in the kitchen where Donna normally kept her handbag for ease of access. The argument has escalated as Donna had tried to reinforce boundaries by preventing the son, Matthew from going out. The officers (an experienced officer and probation officer) arrive at the scene to find Matthew holding a small kitchen knife and waving it in an aggressive manner at his mother.

The following example considers the application of the Decision-Making Framework (Richards et al., 2016) with integrated with captured video in a situation relating to a domestic setting involving mental health issues and knife crime.

The capturing of officer's decision-making in such situations from the first person's perspective (e.g. BWV or the development of synthetic environment using 3d domes), provides a unique opportunity for officers to engage with experiential learning in a safe and controlled environment when the footage can later be reviewed. BWV footage (either real or manufactured) can be used as the stimulus for learning. The approach outlined in the framework above layers the learning for the developing officer into phases. These layers integrate the individual expert's knowledge, situational factors and the context of the setting in which decision is being made. Such a process enables the increasing complexity of the situation to be discussed and achieved. Subsequently, slow in-action reflection (review of the BWV) is applied in the training environments to develop SMMs which can be used by the developing officer to shape and inform future situations. The slow deliberate video-based learning environment empowers individuals (the probation officer) to construct specific SMMs of the situations, in the context of their own performance. This process enables visible points which the experience officers have identified (Richards et al, 2019) to be discussed with the probationary officer. These data points (new knowledge points) are added to existing SMMs of probation officers. This results in existing SMMs of developing officers being updated to establish more refined SMMs (SMM increasing in complexity as experience develops) which are then operationalising and used to shape and inform future actions. Within the mechanism advocated here, the probation officer can learn from and have access to the mental model of the more experienced officers as they both watch footage of a situation together. The experienced officer thinks aloud as the

video is played; exposing the novice officer to a new mental model or way of thinking and working, based on what data points they attend to and how they are perceived. The two officers can be prompted to engage in deliberate structured discussion to identify key aspects of the footage or cues that were used by the experienced officer in the decision-making process (Richards, et al., 2017).

Engagement using the Decision-Making Framework with integrated video (e.g. BWV, synthetic learning environment) to enhance the learning of officers in the following ways:

- Individuals can establish and refine SMMs which can be operationalised to information in-action decision making.
- Probation/developing officers can search from predetermined data points which will help them to operationalise a SMMs more effectively.
- Two or more officers working within the same incidents can attend to data points (cues) within the environment, prioritise information and develop a shared situational understanding of the applied setting when SMMs are developed. The development of this shared situational understanding will enhance communication, a shared common language and supports individuals taking collective action within a situation.
- Engagement in the Decision-Making Framework (Richards et al., 2016) enables multiple SMMs working across different specialist groups to be integrated in a manner to achieve a common objective(s).

Summary and future directions

Modern day policing is evolving and changing as organisations react and respond to the continual changing landscape in which we live. The nature of society is rapidly

changing and officers require an extensive range of knowledge relating to health, mental health and social issues in culturally diverse populations. In particular, the numbers of neurodiversity individuals are increasing and is therefore likely that those individuals will come into contact with police as both victims and perpetrators of crime. Although this is only one example, parallels can be drawn in relation to many other situations encountered by an officer. In order to ensure that probationary police officers are prepared to engage with all individuals in society and continue to protect the public; it is important that any preparation to become an officer facilitates the development of effective communication and decision-making skills. In particular, it is recognised that police officers require fast-paced decision-making skills as they work in volatile and rapidly changing situations; where not all information may be present.

The ability for officers to engage in effective decision-making is essential as every aspect of their role requires them to assess information, interpret and analyse information and subsequently take intelligent action (action intelligence). The importance of enhanced decision-making skills as an attribute of officers is further augmented when the complex setting in which officers work is considered. This continually changing, dynamic setting requires officers to contextualise their own action against those of multiple others and often under a time pressure.

This chapter explored some of the emerging technologies and introduces synthetic learning environments which have been used successfully in other professions and disciplines to facilitate accelerated decision-making in individuals working in a naturalistic setting. We believe that there is a place for the application of these synthetic environments in the preparation of future police officers. Furthermore, we welcome these developments, not least because they offer opportunities to provide a

robust evidence-base practice to support their use, but additionally open up conversations between officers, specialist, academic and researchers as to how we can collectively address the challenge of training our next generation of officers.

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